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(54) Machine for filling bottles and other containers

(57) A machine for automatically filling containers, such as bottles, flasks, etc . . . , of the type comprising stations (5₁ . . . 5_g) disposed as a turntable and provided with siphon-like filling nozzles (6₁ . . . 6_g) of which one leg is immersed in a vat or tank, containing the liquid to be bottled in the containers (7), whilst the other leg

opens out into the container to be filled, wherein the vat (1) comprises a plurality of coaxial annular compartments (2₁ . . . 2_g) without any communication therebetween and the filling stations are grouped in successive and identical groups of nozzles in a number equal to that of the compartments in the vat, each nozzle (6₁ . . . 6_g) being fed by a respective tube (26₁ . . . 26_g) immersed in the compartment (2₁ . . . 2_g) which is allotted thereto.

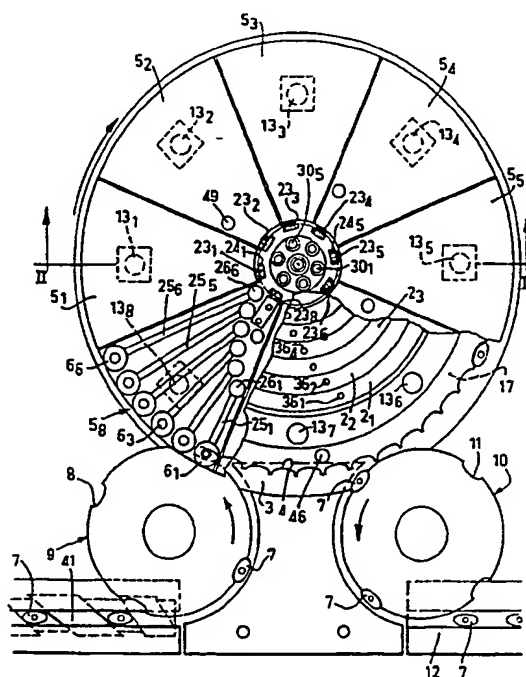


FIG.1

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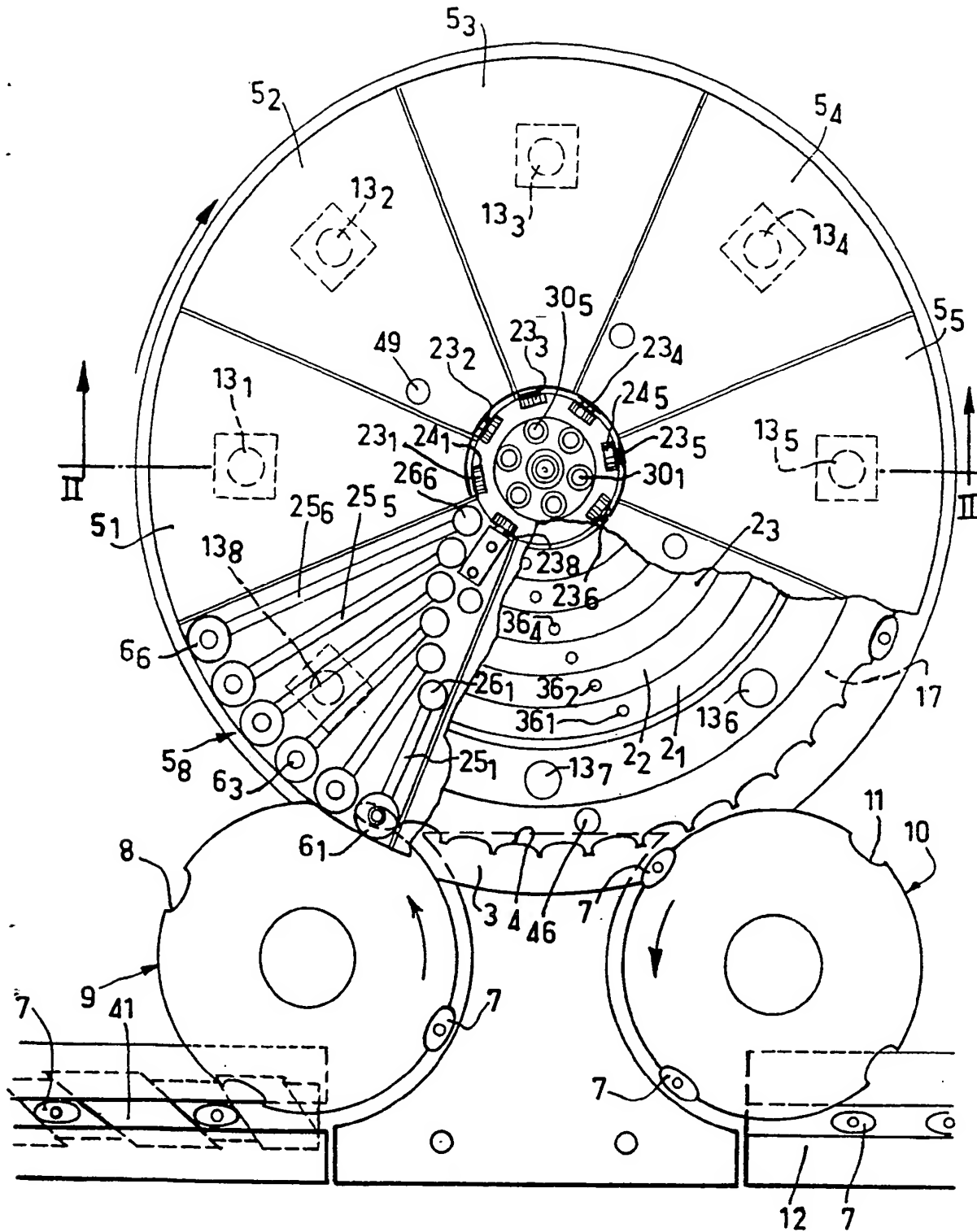


FIG.1

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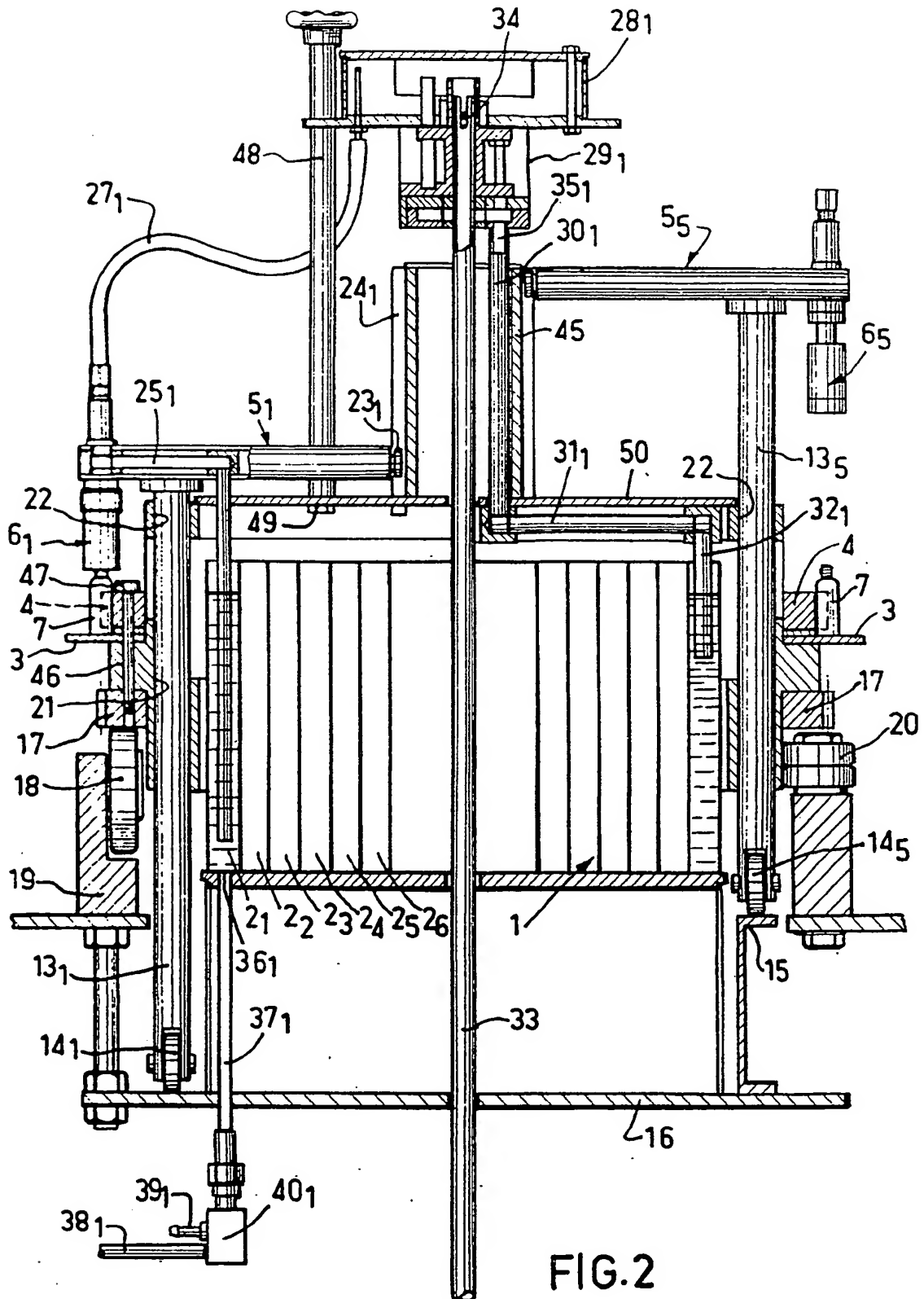


FIG.2

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SPECIFICATION

Machine for filling bottles and other containers

The present invention relates to a machine for automatically filling containers such as bottles, flasks, etc. . . . of the type comprising stations disposed as a turntable and provided with siphon-like filling nozzles, one leg of which is immersed in a vat or tank, containing the liquid to be bottled in the containers, whilst the other leg opens into the container to be filled.

In conventional filling machines which are intended for filling containers with different products, the vat and the circuits must be completely emptied after each operation and subjected to a lengthy difficult cleaning operation.

The object of the present invention is to eliminate this drawback completely.

In accordance with the invention, the vat comprises a plurality of coaxial annular compartments without any communication therebetween and the filling stations are grouped in successive and identical groups of nozzles in a number equal to that of the compartments in the vat, each nozzle being fed by a respective tube immersed in the compartment allotted thereto.

In a particular embodiment, the nozzles of each group are mounted on the same support in the form of a circular sector on which they are regularly spaced and said supports are disposed side by side, fixed radially but movable axially independently of one another.

When the containers are introduced into the machine by recessed wheels, the angular deviation between the nozzles allotted to the same product on the different supports will be the same for all the products, with the result that, to change the filling product, it suffices to shift by pre-determined angles all the nozzle supports with respect to the recessed wheels to present any one series of nozzles opposite the same recesses of the wheels.

In the case of the nozzles functioning under depression and being connected individually to a depression manifold provided with a lock for separating the liquid coming from the overflow of the containers, the invention provides as many lock-manifold assemblies as there are products, each assembly being detachably mounted according to the axis common to the annular compartments and the lock of each assembly being provided with a flow tube whose shape and position are such that it communicates with the annular compartment corresponding to the product to which the assembly is allotted.

To avoid any risk of mixing the products, the flow tube is angularly set with respect to the corresponding nozzles so that each lock can be positioned and function only if it corresponds both to the nozzles and to the annular compartment allotted to the product.

In the particular case of the annular compartments being very narrow, the regulation of the level of the liquid in these compartments can be achieved, instead of cumbersome floats, by

monitoring the level of liquid in a transparent tube outside each compartment and connected thereto through a pipe, in application of the communicating vessels principle.

In the case of the containers to be filled being flasks of small dimensions relatively to the pitch of the filling nozzles it becomes virtually impossible to machine a selection screw for regulating the introduction of the flasks in the input recessed wheel and disposed laterally with respect to the drive shaft. The invention then provides conveying the flasks in the selection zone by a screw on which the flasks rest. This "screw underneath" arrangement enables a screw of large diameter to be used, having a small thread gradient for a very large final pitch. This screw has an increasing pitch in order to take the flasks one by one, accumulated one behind the other, and to space them to correspond to the pitch of the recessed wheel.

The invention will be more readily understood on reading the following description with reference to the accompanying drawings, in which:

—fig. 1 is a plane view, with parts broken

away, and

—fig. 2 is an axial section along the line II—II of fig. 1.

Referring now to the drawings, the machine comprises, in the example shown, a fixed cylindrical vat 1 subdivided into six annular compartments $2_1, 2_2 \dots 2_6$, coaxial with respect to one another and around which rotate, on the one hand, a plate 3 provided with recesses 4, on the other hand eight sectors $5_1, 5_2 \dots 5_5 \dots 5_8$, each carrying six filling nozzles $6_1, 6_2 \dots 6_6$ cooperating respectively with the annular compartments $2_1, 2_2 \dots 2_6$, as will be explained hereinafter.

The bottles 7 to be filled, conveyed and discharged by chains (not shown), are selected and distributed in the recesses 8 or an input turntable or wheel 9 which deposits them in the recesses 4 of the plate 3. After completion of the filling the bottles are taken by the recesses 11 of the output turntable 10 and deposited on the discharge chain or belt 12. Each of the sectors $5_1 \dots 5_8$ is carried by a rod $13_1, (13_2 \dots 13_8)$ bearing at its lower end a roller $14_1, (14_2 \dots 14_8)$ rolling on a cam 15 fast with the frame 16 of the machine on which the compartments 2 rest.

The plate 3 having recesses 4 may be secured for rotation to an annular ring 17 coaxial with respect to the vat 1 and provided with teeth on its periphery to allow its rotational driving in synchronism with that of the wheels 9 and 10. The connection of the plates 3 and 4 and of the ring 17 is achieved by a pin 47 introduced into a bore 46 made in the plates 3 and 4 in one of the forty-eight bores 48 provided in the ring 17 in regular distribution. This ring 17 rests on a series of rollers 18 with horizontal axes mounted idly on a part 19 fixed to the frame and bears laterally against rollers 20 with vertical axes also mounted idly on the part 19. The rods 13 pass through and are guided, in the course of their vertical

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displacement, in bores 21, 22 formed in parts fast with the plate 3. Moreover, each sector 5 is guided in the course of this vertical displacement by a roller 23 (23₁, 23₂... 23₆) displaceable in a
5 respective groove 24 (24₁... 24₆) of a socket 45 also fast with the plate 3.

Each filling head 6₁ (6₂... 6₆) communicates through a horizontal conduit 25₁ (25₂... 25₆) with a tube 26₁ (26₂... 26₆) which is immersed in the
10 corresponding compartment 2₁ (2₂... 2₆). Each head 6₁ also communicates by a flexible tube 27₁ (27₂... 27₆) with a depression manifold 28₁ (28₂... 28₆) mounted according to the axis of the vat 1 and provided with a lock 29₁ (29₂... 29₆)
15 for separating the liquid coming from the overflow of bottles 7. The lock 29₁ communicates through a tube 35₁ which it carries and through the flow conduits 30₁, 31₁ and 32₁ fast with the plate 3, with the compartment 2₁ corresponding to head
20 6₁. The lock-manifold assembly 28—29 is very easily mounted at the upper end of the hollow axial tube 33 connected to the source of depression by means of a bayonet coupling 34. The assembly 28—29 is fixed to the plate 50,
25 itself fast with plate 3, by four rods 48 penetrating at their lower threaded portions in holes 49 in the plate 50 and clamped by nuts. Thus, its connection tube 35 is angularly set with respect to the nozzles 6, with the result that it can only be
30 placed in position if it corresponds to the compartment allotted to the product.

Orifices 36₁, (36₂... 36₆) at the base of the annular compartments 2₁ (2₂... 2₆) cause these compartments to communicate with the tanks
35 storing the different products via conduits 37₁ (37₂... 37₆) and 38₁ (38₂... 38₆). Glass tubes connected to the teats 39₁, 39₂... 39₆, themselves connected to unions 40₁, (40₂... 40₆) for connecting conduits 37 and 38, allow
40 achieving the regulation of the level of the products in the compartments 2 and controlling the feed thereof, by electro-valves connected with the conduits 38 and controlled by photoelectric cells monitoring the level of the liquid in the glass
45 tubes connected to the teats 39.

The selection of the containers 7 upstream of the input recessed wheel 9, is here achieved, not by a lateral screw, as is generally the case, but by a "screw underneath" due to the small size of the
50 flasks in this example. This screw 41 is of large diameter and of small thread gradient for a final large pitch. Its pitch increases to take the flasks 7 one by one, accumulated one behind the other on the input belt and to space them substantially in
55 accordance with the pitch of the wheel 9.

The operation of the machine which has just been described follows immediately from this description. It is the same as that of conventional fillers with a single vat, once the filling product,
60 therefore the annular compartment 2, has been selected, the lock-manifold assembly 28—29 has been mounted at the top of the central shaft 33, the supply tubes 27 of the corresponding heads 6 have been connected to the manifold 28, and
65 once the ring 17 has been set with respect to the

input wheel 9.

In fig. 1, it is seen that the setting has been effected so that the flasks 7 are presented by the wheel 9 beneath heads 6₁ of each sector 5. They
70 will be filled with the product contained in the compartment 2₁. If it is desired to fill the flasks with the product contained in the compartment 2₂, it suffices to shift the plate 3 (with recesses 4) through 1/48th of a revolution with respect to the
75 ring 17, therefore the turntable 9 which is rotatable therewith. This shift is effected by lifting the pin 47 out of the bore 48, then after the rotation of the plate 3 through 1/48th of a revolution, by replacing the pin 47 into the bore
80 48 immediately following the bore from which it was removed. The wheel 9 may also be shifted with respect to plate 3, through 1/24th of a revolution, as it has in the present case four recesses, and, of course, the lock-manifold
85 28₂—29₂ may be placed in position, then connected by the tubes 27₂ to the heads 6₂ of each sector 5.

CLAIMS

1. A machine for automatically filling
90 containers, such as bottles, flasks, etc., of the type comprising stations disposed as a turntable and provided with siphon-like filling nozzles of which one leg is immersed in a vat or tank, containing the liquid to be bottled in the
95 containers, whilst the other leg opens out into the container to be filled, wherein the vat comprises a plurality of coaxial annular compartments without any communication therebetween and the filling stations are grouped in successive and identical
100 groups of nozzles in a number equal to that of the compartments in the vat, each nozzle being fed by a respective tube immersed in the compartment which is allotted thereto.
2. A machine as claimed in claim 1, wherein the
105 nozzles of each group are mounted on the same support in the form of a circular sector on which they are regularly spaced apart and the said supports are disposed side by side, fixed radially but movable axially independently of one another.
3. A machine as claimed in claim 2, wherein the
110 containers are introduced by recessed wheels, the angular deviation between the nozzles allotted to the same product on the different supports being the same for all the products.
4. A machine as claimed in any one of claims 1 to 3, wherein the filling nozzles functioning under depression and being connected individually to a depression manifold provided with a lock for
115 separating the liquid coming from the overflow of the containers there are provided as many lock-manifold assemblies as there are products, each assembly being detachably mounted according to the axis common to annular compartments and the lock of each assembly being provided with a
120 flow tube whose shape and position are such that it communicates with the annular compartment corresponding to the product to which the assembly is allotted.
5. A machine as claimed in claim 4, wherein the

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flow tube of each lock is angularly set with respect to the corresponding nozzles.

6. A machine as claimed in one of claims 1 to 5, wherein the regulation of the level of the liquid in these compartments is achieved by monitoring the level of liquid in a tube outside each compartment and connected thereto by a pipe.

7. A machine as claimed in claim 3, wherein the containers to be filled being of small size relatively

10 to the pitch of the filling nozzles, the selection screw regulating the introduction of the flasks in the input recessed wheel is with increasing pitch, of large diameter, of small thread gradient for a final large pitch and it is disposed beneath the
15 flasks.

8. A machine substantially as described hereinabove and illustrated in the accompanying drawings.

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